

IN THE CLAIMS:

Cancel claims 1-12 without prejudice or admission and add new claims 13-23 as shown in the following listing of claims, which replaces all previous listings and versions of claims.

1. - 12. (canceled).

13. (new) A scanning probe microscope comprising:
a cantilever having a probe at a distal end thereof;
an oscillator for generating a resonance signal near
a resonance of the cantilever;

vibrating means connected to receive the resonance
signal generated by the oscillator as a driving signal for
vibrating the cantilever while the probe is in close proximity
to a surface of a sample;

extracting means for extracting a displacement
signal corresponding to displacement of the cantilever during
vibration thereof;

a variable gain amplifier for adjusting a gain of
the displacement signal extracted by the extracting means so
as to satisfy the equation $G=(A/A_0)*G_0$ to control a quality
factor value of the cantilever resonance to an optimal quality
factor value, where G represents a gain value of the variable
gain amplifier, A represents a preselected oscillation

amplitude of the oscillator, A_0 represents an initial oscillation amplitude of the oscillator, and G_0 represents a gain value of the variable gain amplifier when the initial oscillation amplitude of the oscillator is A_0 ; and

an adder for superimposing an output signal from the variable gain amplifier with an output signal from the oscillator to generate a signal for use as the driving signal received by the vibrating means for vibrating the cantilever.

14. (new) A scanning probe microscope according to claim 13; wherein the vibrating means comprises a plurality of piezoelectric elements.

15. (new) A scanning probe microscope according to claim 13; further comprising displacement detection means for detecting an oscillation amplitude of the cantilever during vibration thereof corresponding to the displacement signal.

16. (new) A scanning probe microscope according to claim 15; further comprising a preamplifier for amplifying the displacement signal and for outputting the amplified displacement signal to the variable gain amplifier via the extracting means.

17. (new) A scanning probe microscope according to claim 16; wherein the extracting means comprises a phase shifter.

18. (new) A scanning probe microscope comprising:
a cantilever having a probe at a distal end thereof;
an oscillator for generating a resonance signal near
a resonance of the cantilever;

vibrating means connected to receive the resonance
signal generated by the oscillator as a driving signal for
vibrating the cantilever while the probe is in close proximity
to a surface of a sample;

extracting means for extracting a displacement
signal corresponding to displacement of the cantilever during
vibration thereof;

a variable gain amplifier for adjusting a gain of
the displacement signal extracted by the extracting means so
as to satisfy the expression $G \propto 1/L$ to control a quality
factor value of the cantilever resonance to an optimal quality
factor value, where G represents a gain value of the variable
gain amplifier and L represents a distance between the probe
and the sample; and

an adder for superimposing an output signal from the
variable gain amplifier with an output signal from the
oscillator to generate a signal for use as the driving signal
received by the vibrating means for vibrating the cantilever.

19. (new) A scanning probe microscope according to
claim 18; wherein the vibrating means comprises a plurality of
piezoelectric elements.

20. (new) A scanning probe microscope according to claim 19; further comprising displacement detection means for detecting an oscillation amplitude of the cantilever during vibration thereof corresponding to the displacement signal.

21. (new) A scanning probe microscope according to claim 20; further comprising a preamplifier for amplifying the displacement signal and for outputting the amplified displacement signal to the variable gain amplifier via the extracting means.

22. (new) A scanning probe microscope according to claim 21; wherein the extracting means comprises a phase shifter.

23. (new) A method of operating a scanning probe microscope having a cantilever probe with a probe tip at a distal end thereof for scanning a surface of a sample, comprising the steps of:

displacing the cantilever probe so that the probe tip approaches the surface of the sample;

acquiring a point corresponding to a first position of the cantilever probe at which a distance between the probe tip and the surface of the sample is zero;

displacing the cantilever probe to a second position different from the first position using the acquired point as

a reference by raising the probe tip to a first distance from the surface of the sample;

controlling at the second position of the cantilever probe a quality factor value of the resonance of the cantilever probe to an optimal quality factor value;

displacing the cantilever probe to a third position different from the second position so that probe tip is disposed at a second distance from the surface of the sample different from the first distance; and

controlling at the third position of the cantilever probe a quality factor value of the resonance of the cantilever probe to an optimal quality factor value.